

Layered Composite Insulation

The National Aeronautics and Space Administration (NASA) seeks to license its Layered Composite Insulation (LCI) technology for use in commercial applications. Designed by the Cryogenics Test Laboratory at the John F. Kennedy Space Center (KSC) in Florida, this easy-to-use system can benefit multiple industries that depend on regulation of low temperatures in equipment and products. The synergistic effect of improvements in materials, design, and manufacture of this new insulation technology exceeds current multilayered insulation (MLI) or foam insulation products.

This new piping insulation can provide cost-saving and product loss-prevention benefits to companies that transfer fluids such as liquefied natural gas, refrigerants, chilled water, crude oil, or low-pressure steam as well as to transport companies that move refrigerated containers by land and sea and need to protect food, medicine, and other perishable commodities.



Potential Commercial Uses

End-users of this technology include those who need:

- To insulate superconducting power transmission cables and equipment.
- To insulate transfer piping for cryogenics.
- To insulate distribution lines for medium-high-temperature steam, gases, or liquids.
- To store commodities such as liquid nitrogen, liquid argon, or liquid CO₂.
- To transport products at various temperatures.
- To insulate space launch vehicle propellant tanks and feed lines.
- To insulate storage vessels and thermal storage devices for industrial applications.
- To insulate hot oil piping in undersea drilling operations.

Potential licensees of this technology may include companies that:

- Manufacture multilayered insulation
- Handle or transport cryogenics.
- Provide services to industries using cryogenics.
- Support industries in which reliable low-temperature regulation is critical.
- Manufacture cryomedical or cryobiological equipment.
- Manufacture refrigeration or transport materials under refrigeration.



Benefits

- Performs up to six times better than the current MLI method.
- Performs better at soft and high vacuum levels than the world's best bulk insulator (ultra-low-density silica aerogel).
- Provides protection against loss of product or overpressurization of tank in case of vacuum-jacket failure.
- Reduces heat leakage due to innovative edge/joint feature.
- Provides good radiation shielding and maximum suppression of gas conduction with compact spacing between layers.
- Reduces evacuation and heating times compared to the current MLI.
- Reduces installation, maintenance, and life cycle costs (no high-vacuum requirements compared to current MLI and no environmental degradation or cracking compared to foam).

The Technology

The technology combines a unique layered cryogenic insulation system with specific manufacturing, packaging, wrapping, and rolling methods. One of the unique features of the LCI is its superior thermal performance: approximate R-values per inch for cryogenic conditions are R-1600 for high vacuum, R-90 for soft vacuum (about 1 torr), and R-10 for no vacuum.

This new LCI system surpasses the current limitations of current MLI systems in:

- Performance in soft vacuum or degraded vacuum environments
- Sensitivity to mechanical compression
- Daily operational maintenance

The new LCI insulation can currently be continuously rolled or can be manufactured in blanket, sheet, or sleeve form. The LCI can also be utilized on aerospace cryogenic equipment, terrestrial cryogenic tanks, pipes, and valves with multiple commercial applications.

Options for Commercialization

NASA seeks qualified companies to commercialize the Layered Composite Insulation technology. This and other technologies are made available by the KSC Technology Commercialization Office through a variety of licensing and partnering agreements. These include patent and copyright licenses, cooperative agreements, and reimbursable and nonreimbursable Space Act Agreements.

Contact

If your company is interested in the Layered Composite Insulation technology or if you desire additional information, please reference Case Number KSC-12092 and contact:

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Commercialization Checklist

- ✓ Patent pending
 - U.S. Patent
 - Copyrighted
- ✓ Available for licensing
 - Available for no-cost transfer
 - Seeking industry partner for further codevelopment

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